

ZOOLOGY.—*Cossura pygodactylata*, a new annelid from San Francisco Bay (Polychaeta: Cirratulidae). MEREDITH L. JONES, University of California, Berkeley. (Communicated by Fenner A. Chace, Jr.)

In the course of sampling the benthic fauna off Point Richmond, San Francisco Bay, Calif. (Jones, 1954), numerous specimens of a polychaete worm of the family Cirratulidae were found. At the outset they were tentatively identified as *Cossura longocirrata* Webster and Benedict, but subsequent examination revealed characters differing sufficiently from the original description to justify setting up a new species for these worms.

Webster and Benedict (1887) erected the genus *Cossura* for the single species *C. longocirrata* from Eastport, Maine. Of their specimens only one was complete, the remainder apparently being anterior portions. Eliason (1920) found specimens which he tentatively identified as *C. longocirrata* in the Øresund, Denmark. He noted minor differences in the shape of the prostomium and the dimensions of the unpaired cirrus. In the following year, Thulin (1921) confirmed Eliason's identification and gave a detailed description of the species, based on well-preserved specimens from the Øresund. Mrs. E. Wesenburg-Lund (personal communication) has identified *C. longocirrata* in collections from the North Atlantic and from the coast of Chile.

*Cossura* has been reported from the Pacific coast of North America several times. Hartman (1952) identified *C. longocirrata* in collections from the Los Angeles-Long Beach area, and Reish and Winter (1954) recorded the same species from Alamitos Bay, California. Hartman (1954) in a checklist of the annelids of San Francisco Bay, listed "*Cossura* nr. *longocirrata*" and credited the author (M. J.) with its collection. In the preliminary results of her study of the benthos of the San Pedro Basin, Hartman (1955) reported specimens of *Cossura* sp. and has recently described this as a new species, *Cossura candida* (Hartman, 1955a). It should be noted that in the description of *C. candida*, Hartman has included the "*Cossura* nr. *longocirrata* (sic) . . ." of her San Francisco Bay checklist

in the synonymy and distribution record of *C. candida*. Actually "*C. nr. longocirrata*" is the species to be described here and *C. candida* is not known to occur in San Francisco Bay.

Family CIRRATULIDAE

Genus *Cossura* Webster and Benedict, 1887

*Cossura pygodactylata*, n. sp.

Fig. 1, A-F

*Cossura longocirrata* Jones, 1954, pp. 36, 37, 48, 83, et al.

*Cossura* nr. *longocirrata* Hartman, 1954, pp. 11, 15.

*Cossura* nr. *longocirrata* (sic) Hartman, 1955a, pp. 44 and 45 (in synonymy and distribution record of *Cossura candida*).

The specimens under consideration were collected from mud off Point Richmond, San Francisco Bay, Calif., at depths of 3, 5, and 30 feet below mean lower low water, and were most numerous at the lowest depth. Approximately 100 specimens were obtained; of these, 15 were entire, the remainder having fragmented when preserved with 10 percent formalin. Several observations of living, intact animals were also made.

Preserved, whole, mature specimens of *Cossura pygodactylata* are 6 to 7 mm in length and about 0.3 mm wide at the 14th (widest) setiger. The number of segments varies from 43 to 56.

Contrary to the observations of Eliason (1920) and Thulin (1921) on *C. longocirrata*, *C. pygodactylata* appears to secrete no well-defined tube. The living animal secretes mucus along the body, to which material (fecal pellets, debris) may adhere, giving the impression of a very loosely constructed tube.

The body is composed of three general regions. The anterior region extends to the 17th-19th setiger and the segmental length is 80-100 micra; the setae occur in bundles at the anterior edge of each segment. The midregion extends back to about 12-20 segments from the pygidium and segmental length is 280-340 micra; the setae are centrally located on each segment. The posterior region consists of 12-20 segments and the segmental length is 100-120 micra; the setae are centrally placed on each segment. Character-

istically, fragmentation occurs just posterior to the beginning of the midregion.

There are no defined parapodia. The setae appear to arise from depressed areas on the body surface, and the bulging of the body surface anterior and posterior to these areas may give the impression of parapodia, with pre- and postsetal lobes (Figs. 1b, 1d, 1e). A ring of thickened tissue surrounds each area of setal insertion (Fig. 1c, TR).

Setae are all simple and vary from capillary to narrowly limbate. They are inserted in two vertical series; the anterior series are composed of coarser setae which are directed from perpendicular to the body axis to slightly posterior of perpendicular; the posterior series consist of slightly finer setae which are swept posteriorly.

The prostomium is conical and devoid of appendages (Fig. 1a), and no sense organs such as eyespots or Thulin's (1921, p. 4) "knopfenförmiges Organ" (button-shaped organ) have been observed. Near its base the prostomium bears a transverse furrow (Fig. 1a, PF), which, as both Eliason and Thulin have observed in *C. longocirrata*, gives a misleading impression that the basal portion is an achaetous segment. In both cleared whole mounts and frontal sections it is seen that the longitudinal muscle bundles are inserted at this point. It seems probable that the furrow is produced as these muscles contract at fixation. The peristomial segment has neither setae nor appendages. The next segment, the 1st setiger, bears a bundle of about six setae on either side. These are nearly perpendicular to the body axis, and their tips are slightly curved posteriorly. The 2d setiger bears a single dorsal median cirrus at its posterior border.

The cirrus remains attached throughout preservation and subsequent washing, but the tip is easily broken off. In one case, a preserved fragmented specimen of 21 segments (3 mm) possessed a cirrus 14 mm in length. Near its point of attachment the cirrus is constricted slightly; it then enlarges to its maximum diameter at the level of the 9th setiger and tapers gradually to its free end. In preserved specimens the cirrus shows a central core of muscle fibers running throughout its length, and the surface epithelium is circularly wrinkled as if it were capable of extreme extension when living. In life the cirrus trails close to the dorsal surface of the body.

The 2d to 6th setigers carry approximately 12

setae on either side (Fig. 1b), and all setae, to the 6th setiger, appear to arise with no indication of noto- and neurosetal bundles. The dorsal setae of these anterior setigers project laterally (most of them are in the anterior series), while the more ventral ones tend to be inclined posteriorly (the posterior series). Further along the body, the dorsal setae become recurved and the ventral setae become more recurved until they are almost parallel to the body surface (Fig. 1c). At about the 7th to 8th setiger, it is possible to differentiate noto- and neurosetal bundles and the number of setae increases to 16-18 per side (Fig. 1d). This number and disposition continue through the remainder of the anterior region to about the 17th to 19th setiger.

The midregion is characterized by longer segments and, in the case of ovigerous females, by the presence of many large eggs. The setae in this region arise in the middle of each segment and are slightly recurved. There are from 4 to 6 notosetae and a like number of neurosetae in this region (Fig. 1e).

In the posterior region the number of setae is gradually reduced from 4-6 in each bundle to 2 notosetae and 2 neurosetae on each side in the segments just preceding the pygidium. In the posterior region, the setae are directed more and more anteriorly as the anal segment is approached. In preserved material, the segments of the ovigerous and following region take on a moniliform appearance, which has not been observed in living material.

The eggs are oval and up to 140 micra long by 100 micra wide. A single segment may contain as many as forty eggs. All specimens large enough to be considered mature and which had not fragmented anterior to the ovigerous region, contained eggs. Unequivocal males have not been observed.

The pygidium or anal segment (Fig. 1f) is cleft in the dorso-ventral plane to form two lateral lobes (AL). It has three long cirri (PC) up to 0.7 mm in length (approximately as long as the last 10 segments). Two of these are inserted dorsolaterally on the outer surface of the anal lobes; the 3rd is inserted ventrally, where the lobes join. Along the margin of each anal lobe are 6-10 fingerlike processes approximately 0.1 mm long (PP). No mention of these is made by either Webster and Benedict (1887) or Thulin (1921) in their descriptions of *C. longocirrata*, or by Hartman (1955a) in her description

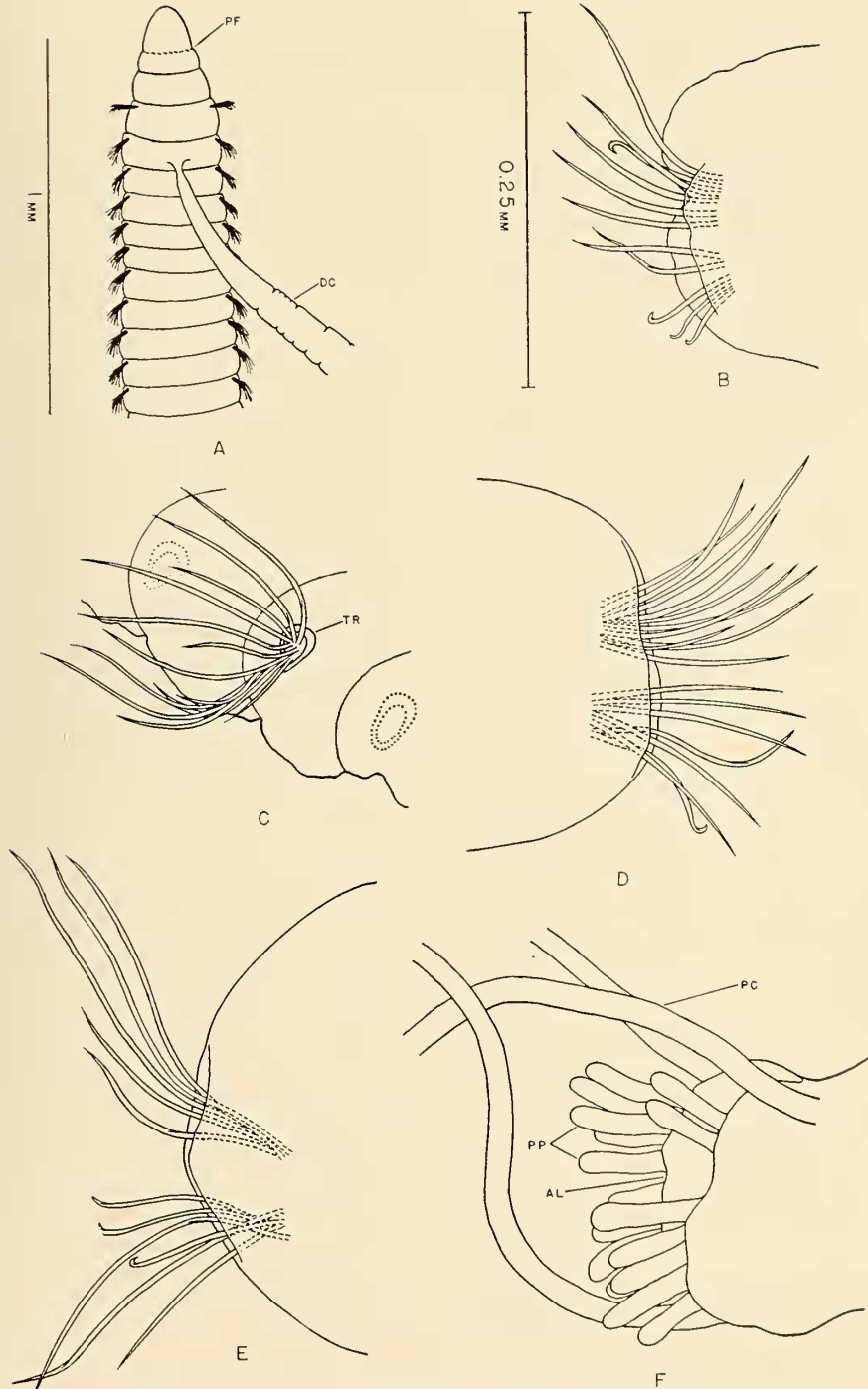


FIG. 1.—*Cossura pygodactylata*, n. sp.: a, Dorsal view of the anterior end of the animal; b, 5th right setiger in anterior view (setae appear bent or hooked in the figures to indicate their curving posteriorly); c, 5th right setiger in dorsolateral view, dotted areas show the position of the setal bundles of the 4th and 6th setigers; d, 9th left setiger in anterior view; e, 25th right setiger in anterior view; f, lateral view of the pygidium. Figures 1c, 1d, 1e, and 1f are to the same scale as 1b. (Abbreviations are as follows; AL—anal lobe; DC—dorsal cirrus; PC—pygidial cirrus; PF—prostonial furrow; PP—pygidial processes; and TR—thickened ring of tissue.)



of *C. candida*. These processes are the most obvious character separating the new species from the other species of *Cossura*, and the new specific name is based on their presence. In living animals it has been observed that these pygidial processes are not retractile.

Unfortunately, only 2 specimens were observed with the proboscis everted. The proboscis apparently has 4-8 finger-shaped processes directed anteriorly, and they appear to be similar to those shown by Thulin (1921, Fig. 2) for *C. longocirrata*.

A table comparing the described species of *Cossura* is presented. It is based on the work of Webster and Benedict (1887), Eliason (1920), Thulin (1921), Hartman (1955a), and the present description.

	<i>C. longocirrata</i>	<i>C. pygodactylata</i>	<i>C. candida</i>
Insertion of cirrus	2d setiger	2d setiger	3d setiger
Pygidial processes	Absent	6-10 on each anal lobe	Absent
Length	6-12 mm	6-7 mm	7-10 mm
Width	0.35-0.8 mm	0.3 mm	0.5-0.7 mm
Number of segments	50-70	43-56	50-75
Sense organs on prostomium	Present	Absent	Nuchal organs present at sides of prostomium. <sup>1</sup>
Number of setae per segment	8-18	8-18	12-16
Character of tube	Thin, rather long, membranous	None	Present on some. <sup>1</sup>
Depth where found	6-120 feet	3-30 feet	36-2640 feet
Distribution	Eastport, Maine; Øresund, Denmark; North Atlantic; coast of Chile.	San Francisco Bay, Calif.	Southern California.

<sup>1</sup> According to personal communication from Dr. Olga Hartman.

The holotype of *Cossura pygodactylata* (U.S.N.M. no. 27609) and the paratypes

(U.S.N.M. no. 27610) have been deposited with the U. S. National Museum.

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